



UNITED STATES PATENT AND TRADEMARK OFFICE

cen

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

10/564,249

01/11/2006

Shouichi Miyawaki

1141/75707

8021

23432 7590 07/30/2007
COOPER & DUNHAM, LLP
1185 AVENUE OF THE AMERICAS
NEW YORK, NY 10036

EXAMINER

VAUGHN, MEGANN E

ART UNIT	PAPER NUMBER
----------	--------------

2859

MAIL DATE	DELIVERY MODE
-----------	---------------

07/30/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/564,249	Applicant(s) MIYAWAKI ET AL.	
	Examiner Megann E. Vaughn	Art Unit 2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 30 April 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 14-16 and 19 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-8, 11, 12, 14-16 and 19 is/are rejected.
- 7) ☒ Claim(s) 9 and 10 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments with respect to claims 1-18 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-7, 11-12, and 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Miyoshi (US 6559643) in view of Miyamoto (US 6483305).

Regarding claims 1, 11, and 12, Miyoshi discloses magnetic resonance imaging method and apparatus (see figure 1) comprising: (1) a step for applying one or more pulses of the gradient magnetic field sequentially (column 6, lines 18-20; figure 3, RS1-RS4) and detecting nuclear magnetic resonance signals for reconstructing magnetic resonance images; (2) a step for calculating the residual magnetic field being generated in the magnetic device by the gradient magnetic field (column 6, lines 18-58; figure 2); and (3) a step for correcting the residual magnetic field calculated in step (2) (column 6, lines 59-63).

Miyoshi does not disclose that the step for calculating the residual magnetic field being generated in the magnetic device by the applied gradient magnetic field on the

basis of the residual magnetic field response function that represents the relation between the strength of the applied gradient magnetic field and the strength of the residual magnetic field being generated by the applied gradient magnetic field; and that the step for correcting the residual magnetic field calculated along with the application of each pulse of the gradient magnetic field; and a step for updating the residual magnetic field response function in accordance with the strength of each pulse of the applied gradient magnetic field along with the application of the gradient magnetic field pulses, wherein the calculation of the residual magnetic field is executed by using the residual magnetic field response function.

Miyamoto discloses in figure 4, a magnetic resonance method for reducing residual magnetization caused by gradient pulses (Abstract) wherein the step for calculating the residual magnetic field being generated in the magnetic device by the applied gradient magnetic field on the basis of the residual magnetic field response function that represents the relation between the strength of the applied gradient magnetic field and the strength of the residual magnetic field being generated by the applied gradient magnetic field (column 6, lines 53-65); and that the step for correcting the residual magnetic field calculated along with the application of each pulse of the gradient magnetic field (see figure; column 6, lines 53-56); and a step for updating the residual magnetic field response function in accordance with the strength of each pulse of the applied gradient magnetic field along with the application of the gradient magnetic field pulses, wherein the calculation of the residual magnetic field is executed by using the residual magnetic field response function (column 6, line 53- column 7, line 28).

Therefore it would have been obvious to a person having ordinary skill in the art at the time that the invention was made to calculate and correct the residual magnetic field disclosed by Miyoshi using the method wherein the residual magnetization correcting pulse is calculated and applied in real time with the gradient pulses as taught by Miyamoto (figure 4) in order to reduce residual magnetization caused by each gradient pulse as it occurs throughout the pulse sequence.

Regarding claim 2, Miyoshi discloses that before the steps (1) - (4) are performed, a step for degaussing/demagnetizing the residual magnetic field being generated in the magnetic device, and for initializing the residual magnetic field response function to the state after degaussing (column 4, line 56- column 5, line 3).

Regarding claim 3, Miyoshi discloses a step for obtaining the residual magnetic field response function after degaussing and for storing it as the calibration data is performed (column 4, line 56- column 5, line 3; column 6, lines 59-67).

Regarding claims 4 and 5, Miyoshi discloses a magnetic resonance imaging method according to claim 1, wherein the correction of the residual magnetic field in step (3) is performed by superposing the correction magnetic field over the gradient magnetic field, wherein the superposed and applied correction magnetic field is the gradient magnetic field that has the same axis as the previously mentioned gradient magnetic field (column 6, lines 65-67; figure 5).

Regarding claim 6, Miyoshi discloses that the superposed and applied correction magnetic field includes components other than the gradient magnetic field that has the same axis as the previously mentioned gradient magnetic field (see figure 5).

Regarding claim 7, Miyoshi discloses that the correction of the residual magnetic field in step (3) is performed by varying the strength of the gradient magnetic field for applying to correct the residual magnetic field of which its strength is previously calculated (column 6, lines 59-67).

Regarding claim 14, Miyoshi discloses that the correction magnetic field is the gradient magnetic field that has the same axis as the previously mentioned gradient magnetic field (column 6, lines 65-67; figure 5).

Regarding claim 15, Miyoshi discloses that the superposed and applied correction magnetic field includes components other than the ones of the gradient magnetic field, that have the same axis as the previously mentioned gradient magnetic field (see figure 5).

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyoshi (US 6559643) in view of Miyamoto (US 6483305) as applied to claims 1-7, 11-12, and 14-15 above, and further in view of Goto (US 6392411).

Regarding claim 8, Miyoshi and Miyamoto disclose a magnetic resonance imaging method according to claim 1 as state above in paragraph 3. Miyoshi and Miyamoto do not specifically disclose that the residual magnetic field response function is represented by drawing a residual magnetic field response curve on a two-

Art Unit: 2859

dimensional chart of which the x-axis indicates the applied gradient magnetic field and the y-axis indicates the residual magnetic field being generated by the application of the gradient magnetic field.

Goto discloses in figures 6-8, charts that represent the relationship/curve between the applied gradient magnetic field (x-axis) and the residual magnetic field (Y-axis) (see figures). Therefore it would have been obvious to a person having ordinary skill in the art at the time that the invention was made to represent the relationship between the applied gradient magnetic field and the residual magnetic field, both disclosed by Miyoshi and Miyamoto, on a chart, as taught by Goto, in order to visually show the applied gradient magnetic field/pulse that is necessary to achieve a desired residual magnetic field as taught by Goto (column 7, line 61- column 8, line 24).

5. Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Miyoshi (US 6559643) in view of Miyamoto (US 6483305) as applied to claims 1-7, 11-12, and 14-15 above, and further in view of Carlini (US 6867590).

Regarding claim 16, Miyoshi and Miyamoto disclose a magnetic resonance imaging apparatus according to claim 12 as stated above in paragraph 3. Miyoshi and Miyamoto do not disclose that the correction magnetic field generation means is correction coils.

Carlini discloses a method of compensating for gradient induced eddy currents in wherein correction coils are used for compensation purposes (column 7, lines 20-28). Therefore it would have been obvious to a person having ordinary skill in the art at the

time that the invention was made for Miyoshi and Miyamoto to utilize correction coils, as taught by Carlini, in order to help correct/compensate the residual magnetic field induced by the gradient magnetic field.

Allowable Subject Matter

6. Claims 9 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is an examiner's statement of reasons for allowance:

Claims 9 and 10 are allowable over the prior art of record because the prior art of record does not teach or disclose a magnetic resonance imaging method wherein the updating of the residual magnetic field response function by step (4) includes a step for varying the value of Y, in the residual magnetic field response curve shown in the two-dimensional chart so that it becomes the same value as calculated in step (2) in the range between zero and the strength of the applied gradient magnetic field pulse, in combination with the remaining limitations of the claims..

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Megann E. Vaughn whose telephone number is 571-272-8927. The examiner can normally be reached on 8 am- 5 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2859

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MEV
Patent Examiner Art Unit 2859
7/22/07



Diego Gutierrez
Supervisory Patent Examiner
Technology Center 2800